YOU and water

6 LESSONS ABOUT WATER

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Man's need for water increases with the passage of time. Once, 3 to 5 gallons per day was enough for each person. Today, the average farm home needs at least 60 gallons daily for each member of the family. Since 1900, the population has doubled, but the per capita use of water has quadrupled, mostly because of industrial and agricultural demands. Water shortage, poor water quality, or both affect about one-quarter of our population.

We can get some idea of the extent of our water needs by thinking of the amount that is used in the home for cooking, cleaning, washing dishes and clothing, watering the garden, washing the car and ourselves. Many homes now have automatic washing machines and dishwashers that require large quantities of water. And the Saturday night bath by the kitchen stove has been replaced by the more-often-used shower or tub.

The aim of man with respect to water is to have a continuous, controllable supply available--enough in times of drought, and not overwhelmingly too much when snows melt or heavy rains fall. To achieve this he uses his scientific and technical skills in such projects as seeding clouds, converting sea water, increasing the water-holding capacity of soil, reclaiming waste water, and constructing dams. Add to this a less wasteful use of water and there will be enough of it to satisfy all future needs.

Questions for Discussion

1. How many times a day do you use water? For how many different uses?

2. What part has water played in the location of your community? In its development?

3. How much does your water cost you in household bills? How much does it cost as a community development?

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2. "Water, Land, and People" - Bernard Frank and Anthony Netboy, Alfred A. Knopf, New York, 1950.

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WATER CYCLE AND WATER SUPPLY

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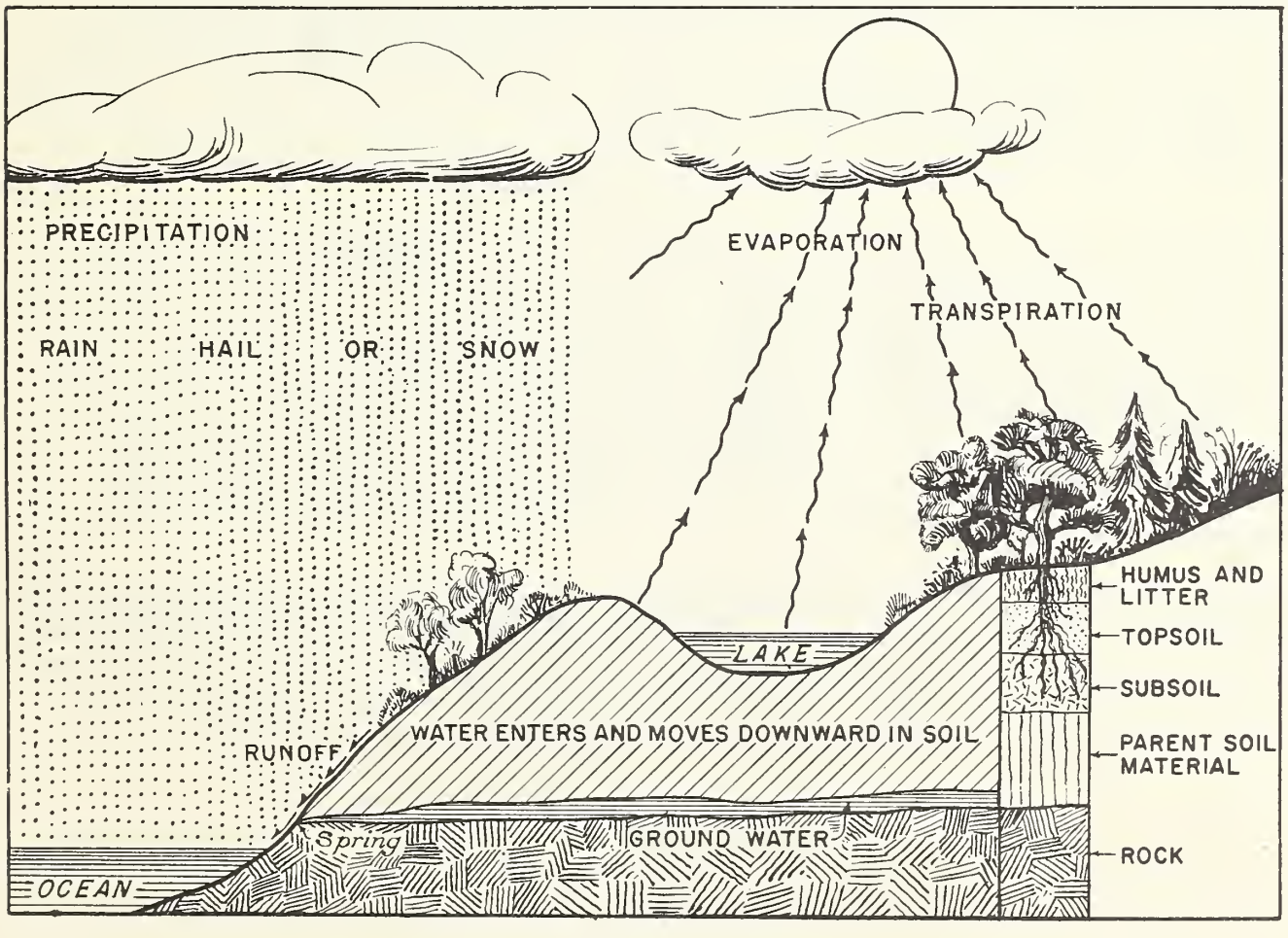
Water comes to the land--whether it be a river basin or the back forty of a farm--in the form of rain or snow and makes of that land a watershed. The water comes as a result of a constant circulation of the earth's moisture and water. This is known as the water cycle.

Rain falls upon the land and is soaked into the earth. Some of it is used by plants and animals in their life processes, some is used by man, and some makes its way underground to be stored or to reappear at another place to feed streams and rivers. Much of it goes back into the atmosphere through evaporation and transpiration. Clouds form and, when conditions are ripe, the water is released to earth again in the form of rain or snow. And thus, the cycle goes on endlessly.

Rain and snow fall on watersheds. Watersheds are drainage basins which tend to funnel the water into streams. They may vary in size, shape, condition, and other important characteristics such as soil, humus, bacteria, trees, shrubs, grass, wildlife, streams, lakes, underground water, towns, farms, and industries. Your watershed may contain mountains or plains or both, as well as your yard or farm and your neighbor's woodlot. All the land within it will contribute to



the water used in a distant city. You may be able to gage the condition of the watershed by the quality of water that flows through your land.

What happens to rain after it reaches the ground determines how useful it will be to man. When it falls on a well-managed watershed, the soils of forests and farms will absorb and hold much of it in storage. The benefits will be apparent in a clear, dependable supply of water, abundant fish, and good crops.

When rain falls on poor watersheds or bare ground, it seals the surface pores and compacts the soil. If water cannot percolate into the soil, it runs off the surface and into the stream. In the process, valuable topsoil is often eroded away. The condition of the surface of the watershed, therefore, determines in large part the amount of precipitation that can be kept on the land.

Since the source of much of our water is in the rain and snow accumulations on mountain watersheds, these areas must be managed well. The essence of watershed management is expressed in the old Chinese proverb: "To rule the mountain is to rule the river." And, we may add, not only the river, but all the land below the mountain as well, including your farm or town. Responsibility does not end with the maintenance of good watershed conditions in the mountains. It extends down into the valley to the owner of every piece of land that is part of the watershed.

To insure a steady supply of water requires research. Research is an important part of good watershed management. In this connection, watershed scientists have been doing considerable work on the manipulation of vegetation, in both amount and kind, to increase water yields on streams. Some possibilities are to convert trees to grass, or brush to grass; to thin stands of trees; to clear out vegetation growing along streambanks; and to eliminate deep-rooted plants from flood plains.

The wrong kind of land use--excessive timber cutting, poor farm practices, roadbanks and devastated areas left bare, too much grazing or fire--can lead to an inadequate supply of water or to floods. An inadequate supply of water because the water-storing quality of the soil has been impaired; floods because the water-absorbing quality of the soil has been impaired, resulting in fast runoffs. Floods are dangerous to life and property. Besides the enormous damages they have caused, over 2,400 persons have been killed by floods in the United States in the past 30 years.

Floods can be controlled by dams and other structures erected to contain the waters. Dams may be effective as flood control measures, but unsatisfactory watershed conditions may reduce their effectiveness as storage places for water. Silt flowing from poor watersheds into reservoirs formed by dams lowers their capacity to store water.

Watershed improvements can, in the long run, be equally effective in reducing the danger of floods. Watershed improvement aims to gain more control of the water on the land by increasing the infiltration of rainfall into the soil, to delay the occurrence of highest flow of water in streams after a rainstorm. To do this may require the extensive restoration of a watershed by use of small structures and by establishing plants to help stabilize the soil and lessen the water runoff. On the farm, flood prevention can be practiced through good soil and cover management.

Any study of water must include basic information on the condition of the watershed that yields our water supply. Rural women can seek this information and thereby evaluate their local watershed. Some of the points to consider are:

1. Is the watershed used for farming, grazing, logging, recreation, or a combination of purposes?

2. What is the condition of the vegetation on the watershed?

3. What is the condition of the ground? Is it protected by plants and covered with humus and plant litter, or is it bare or gullied?

4. Are there signs of serious erosion on the watershed? Are streambanks eroding or stable?

5. Is the watershed functioning properly; that is, is it yielding water suitable for human use, for irrigation, for fish and wildlife, for recreation and industry?

Questions for Discussion

1. What is a watershed?

2. What are the characteristics of a good watershed?

3. Has the level of underground water in your community dropped?

4. What effect does "shaving" the land have on a watershed's ability to replenish water supplies?

5. How does a damaged watershed affect the life of a reservoir, irrigation ditches, a city water system?

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2. "Soil" - the Yearbook of Agriculture, 1957

} Ask your local librarian where you can borrow these yearbooks.

3. "Know Your Watersheds," L-282; "Water and Our Forests," AIB-71; "Mississippi Valley's Woods," PA-310; "Watershed Management Policy for National Forest Lands"--Forest Service, U.S. Department of Agriculture, Washington 25, D.C.

4. "Water, Land, and People" - Bernard Frank and Anthony Netboy, Alfred A. Knopf, New York, 1950.

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   "Waters of Coweeta"

   } - 16-mm. colored motion pictures. (Write to Forest Service, Washington 25, D.C., for film catalog.)

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WATER AND THE FARM

Water is important to every aspect of life and production on the farm. Indoors, it is the basic ingredient for almost every household duty. Outside, it is the life-giver to lawn and garden, crops, livestock and poultry. An animal may live after losing all its fat and about one-half its protein, but death would follow if its body lost about one-tenth of the water content.

In some arid regions where the farmer depends on irrigation as the sole source of water, it is the prime necessity for successful farming.

It has been said that next to a wife, water is the most important thing needed to operate a farm. The daily water needs for each person on a farm averages between 50 and 60 gallons; for milk cows, 15 gallons; for other cattle and horses, 10 gallons; for hogs, 4 gallons; and for sheep, 3 gallons. The total for rural homes is about 2.5 billion gallons per day. An average of 81 billion gallons of water per day flows through our country's irrigation ditches, exceeding by 5 times the water used by municipalities.

Of course, fertile soil and good farming practices, as well as water, are essential to a farm's success. It is the availability and use of water, however, that can be the beneficial or destructive force on the farm. Too much will damage crops, too little or none at all will kill them. If water is not controlled and used wisely, the fertility of the land may be impaired by loss of soil, gullies, and sand and gravel deposits. Land with water tables that are too high or too low may also affect a farm's productivity.

Every good farmer wants to increase the amount of water taken into his soil. Erosion often results when water falls or flows onto the soil at a faster rate than it can be absorbed. Knowing the damage surface-flowing water can cause, many farmers try to develop a high rate of infiltration in their soil. Crops benefit from this greater water supply, there is less runoff and erosion, and less danger of floods.

Some of the measures that conserve soil and give better water control, increase the rate at which soil absorbs water, and improve the storage capacity of soil are: contour plowing, strip cropping, level terracing, crop rotation, green manures, regrassing, reforestation, and conservative management of forest, range, and pasture.

More water is stored in the soil and in underground reservoirs than in all surface reservoirs and lakes combined, including the Great Lakes. In many areas, however, ground water is removed many times faster than it is replaced. One result of this has been a drop in the water level of wells, upon which many irrigation projects, communities, and industries depend.

In the Eastern States, forests cover almost one-half of the land area. Most of these are in private hands. Farm woodlots make up a considerable portion of these holdings. The woodlot is as much a part of a watershed as the rest of the farm. A large percentage of our population depends on these watersheds for its water. The volume, behavior, and quality of water reflects the condition and uses of the lands from which it drains. Good farming methods, plus equally good woodlot management, all practiced on a wide scale, can go far toward easing water-supply problems.

Each farmer wants an ample supply of water for his needs. He doesn't want the kind of water that deposits sediment in his pond. He doesn't want his topsoil endangered by too much water, or his crops endangered by too little of it. He would like to control the action of water on his land so that it will give him the greatest possible service. To achieve this, all farmers within a watershed should cooperate in applying good conservation practices to their own lands.

The farmer must assume the responsibility of seeing that his land functions as a good watershed, and that the water flowing from his land is clear and unpolluted. This means that the condition of his land will be such that rain will sink into the soil, add to the land's water storage, and be available for beneficial use.

If each farmer manages his land so that the maximum use is derived from available water, and this same practice spreads to stockmen, timber operators, and all others on whom good watershed values depend, then the United States should have little trouble in meeting the water needs of future generations.

Questions for Discussion

1. What is the source of water for farms in your area?

2. Is your underground water supply ample? Is it being drawn on too heavily? How does the water table affect property values?

3. Is there any erosion on the farms in your area?

4. Which river drains the farms; of which great river basin is your area a part?

5. What would a water shortage do? How would it affect you?

6. As an owner of farm or woodland property, how does erosion and loss of water on your land affect you and your neighbor?

7. How can water be conserved in the farmhouse?

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3. "Know Your Watersheds," L-282; "Water and Our Forests," AIB-71; and "Mississippi Valley's Woods," PA-310 - Forest Service, U.S. Department of Agriculture, Washington 25, D.C.

4. "Water Facts," PA-337; "Grass Waterways," L-259; "Water Rights," PA-306; and "The Soil That Went to Town," AIB-95-Soil Conservation Service, U.S. Department of Agriculture, Washington 25, D.C.

5. Motion pictures: "From the Ridge to the River" and "Rain on the Plains." (Write to U.S. Department of Agriculture, Washington 25, D.C. for film catalog.)

WATER USERS

The United States uses about 180 billion gallons of water daily. Of this, the greatest amount of fresh water is used for irrigation. Lesser but still enormous quantities take care of industrial, municipal, and rural-domestic needs.

Irrigation is a blessing to both agriculture and industry. It has made arid lands productive, contributed toward a larger and more stable livestock industry by increasing feed crops, and supplied other industries with the raw materials of food and fiber. In addition, it has brought to the valleys of the West a greater variety of crops, diversity in farming enterprises, longer growing seasons, and a larger measure of stability. To irrigate our land requires from 75 to 100 billion gallons per day, or half the amount of fresh water we use.

Occupying only one-sixteenth of the total harvested cropland, irrigated land produces one-eighth of the Nation's crops. On the average, one acre of irrigated land has twice the capacity of one acre of non-irrigated land. In the West, it is equivalent to 3 acres of dry-farm land.

Irrigated land has increased considerably, and is expected to expand further. This will require more dams, better managed watersheds, and better management of present supplies through a reduction in distribution losses and a more efficient use of available water.

Many industries look for good-quality water in choosing a plant site. It is more important to them than the proximity of raw materials or the availability of a local labor force. Some industries located near national forests have selected their sites because of the dependable supply of usable water these public lands produce.

Water is used by industry mostly for cooling (steel, synthetic rubber), processing (food, pulp and paper), and generation of electric power. Steel, for instance, requires as much as 60,000 gallons per ton of finished product. The daily water need of a paper plant using 1,800 cords of pulpwood a day may amount to 20 million gallons.

New products and increased use of older products tax our water supplies still further. Rayon and nylon, for example, are recent arrivals on the industrial scene. A plant manufacturing these materials and employing about 3,500 people may need 20 million gallons of water per day. A growing demand for aluminum means 160 gallons of water for each additional pound made.

The industrial capacity of the United States is rising and is expected to continue to rise as the population grows. Estimates of industry's use of water in 1950 ran to 80 billion gallons per day. Forecasts for 1975

increase this figure to 215 billion gallons per day; a steep rise from 35% of the total water used in this country in 1950, to 63% in 1975. In the face of this, we can expect industry to economize in its use of water, and also find more ways of reusing water for its needs.

Municipalities use about 14 billion gallons of water per day. Some operate their own watersheds; generally, the smaller cities and towns depend on ground water for their supply. Here, too, the demand for water will keep pace with population growth.

Rural use of water, excluding irrigation, amounts to about 2.5 billion gallons per day. About 72% of this comes from underground sources. Wells are common in rural areas throughout the country and take care of most of the farmers' domestic and stock-water needs. The problem in some parts of the country is one of raising ground-water levels where the cutting of deep gullies has lowered the water table.

These, then, are the chief users of our water. That they and their needs for water will increase is evident. Planning for maximum water resource development in order to service these needs adequately will require good watershed management, good forestry practices, soil conservation, and cooperation from all segments of society.

Questions for Discussion

1. What is the chief use of water in your area?

2. What part did an adequate supply of water play in attracting industry to your area?

3. What would happen to the prosperity of your area if lack of water curtailed production in established industries?

4. Which local industries use farm products? Products from farm forests?

5. Do you have adequate water for protection from fire?

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WATER AND RECREATION

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Outdoor recreation plays a prominent part in American life, more so perhaps, than in any other country. Mountains and seashores, forests and deserts are magnets that draw millions of people to them for relaxation and recreation. Some enjoy the outdoors passively, in its sights and sounds and general atmosphere. Most others find it a place for active participation in a variety of activities such as photography, camping, picnicking, hiking, skiing, hunting, fishing, riding, and other sports.

Recreation is as important to the farmer as it is to the urban dweller. Often, however, the alluring mountains or beaches are too distant, or he just can't spare the time to enjoy them. Many farmers then create their own recreation areas with the natural materials at hand.

A body of water is a desirable feature in recreational planning. The mere sight of it is enjoyable, but the greatest enjoyment by far comes from using it for swimming, boating, or fishing. The farm, with its stream or pond, affords countless hours of healthful relaxation for the family and its friends. In many instances, the old swimming hole of the past has been replaced by the artificially created farm pond--a multi-purpose storage facility for supplemental crop and livestock watering. It is also well-stocked with fish and is usually equipped with a diving board.

The farmer can be a great help in maintaining the recreational values of water. Fishing, for instance, is one of the most important recreational pursuits in the United States. It claims the interest of over 30 million Americans. These fishermen require a thriving fish population. Fish population depends upon the condition of the water habitat which, in turn, depends upon the condition of the watershed. A poor watershed may mean floods that destroy spawning beds or sediment that chokes fishing streams. Big streams are fed by little ones, and the way farmers manage their farm-watersheds may contribute to the quality of a fishing stream.

A muddy river is the result of a poor watershed. Not only are fewer fish produced, but the river loses its appeal as a swimming place.

Farmers can also help by being particularly careful with fire in their fields and woodlots. Fire is another destroyer of the recreational values of land and water. It can scar the most beautiful scenery. By destroying the plant cover, it increases the hazards of floods and damaging sediment, thus endangering fish and other wildlife. Women's groups can play an active part in informing the public about the fire menace by pointing out its consequences and by promoting fire prevention programs.

Outdoor recreation is expected to increase considerably in the years ahead. More leisure and better transportation will place greater strains on existing recreation facilities. The number of people engaged in outdoor recreation now makes it one of the major industries of our country.

What can rural women do to improve or create outdoor facilities involving the recreational use of water? Some groups have sponsored the development of public ponds along the highways, with picnic tables and fireplaces nearby. Designed to be used by travelers and local citizens alike, some of these ponds serve a triple purpose--recreation, beauty, and a source of additional water for fighting fire.

Some women who own land and water resources have developed a portion of them for community use. Groups of women have promoted "clean waters" educational programs. Others have helped save recreation areas along lakes and rivers from destruction.

By learning that water can be utilized in many ways--in the serious task of maintaining life as well as in the lighter task of providing fun and relaxation--women will more readily appreciate the necessity of a more abundant and cleaner supply of water.

Questions for Discussion

1. What part does water play in providing recreation in your community?

2. Do you have a municipal swimming pool?

3. Are there opportunities for developing recreation facilities on farms in your area? Will they help promote inter-farm or community gatherings?

4. What can be done about man-caused forest fires in your area? About the litter problem?

5. Can recreational facilities be developed in conjunction with flood control projects on your watershed?

6. Extend an invitation to urban women to visit farms, watersheds, and recreation areas to observe and discuss water conditions.

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2. "A Water Policy for the American People" - Volume 1, The President's Water Resources Policy Commission, 1950. Chapter 16 - "Recreation."

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WATER--USABLE OR POLLUTED?

One consequence of our country's growth is the problem of water pollution. The withdrawal of primitive lands for agricultural use and the crudeness of early farming methods reduced the cover of trees and grass, transformed good watersheds into poor ones, and so contributed to the siltation of streams. In the cities, increasing populations and industrial establishments added to the pollution problem by dumping raw wastes into the rivers.

Water pollution is a menace to the health and economy of our country. The farmer knows that his crops may transmit disease if they are irrigated by water containing sewage. Irrigated crops can be damaged by water carrying chemical wastes or other industrial pollution. Continued use of polluted water for livestock is unsafe.

To be valuable, water must be usable, and usability depends upon the extent of pollution in the water. Pollution has three sources: silt from soil erosion, sewage from domestic use in town or city, and industrial wastes. Sewage and industrial wastes alone have so polluted our streams and rivers that the Public Health Service has estimated it will cost 9 to 12 billion dollars to clean them up. To correct excessive siltation in 4,000 small watersheds may cost as much as $6 billion by the mid-1960's.

Silt is soil that washes into streams, muddies the waters, and fills up reservoirs, thus reducing their water-storing capacities. A small amount of silt added to water makes it unfit for human consumption and for most industrial purposes. Unscreened silt can be an expense to homeowners when it damages plumbing. Silt in irrigation ditches is an expense to farmers because the ditches have to be cleaned or new ones dug. Some irrigation ditches have been silted up completely by soil erosion from misused watershed lands.

Sewage includes everything that goes into the sewer system of a city--body wastes and used water from toilets, sinks, bathtubs, restaurants, laundries, hospitals, and mortuaries, to mention a few. Industrial wastes are the acids, chemicals, oils, greases, and animal and vegetable matter discharged by factories into city sewer systems or directly into watercourses.

The damage done by these forms of pollution is extensive. Desirable fish, for example, do not thrive in heavily polluted water. Silt damages spawning grounds, keeps the light out of streams, causes water temperatures to rise, suffocates fish, and reduces the availability of fish foods. Because of water pollution, the annual salmon catch in one western valley has decreased in value from 5 million to 1 million dollars.

Besides being unsafe for livestock and crops, industrial pollution and sewage wastes lessen the value of water for recreation. Beaches close down, boating and waterside picnicking lose their appeal, and streams produce fewer fish for sportsmen. As a result, the recreation industry suffers an economic loss.

Water pollution can be controlled. State and Federal laws have been enacted for that purpose. More sewage and industrial wastes are treated before being discharged into streams. A few rivers have been cleaned up through the cooperative efforts of two or more States.

Farmers can help in this fight against pollution. They can do this by protecting their lands against erosion and managing them so as to provide a maximum of clear water and a minimum of flash runoff and silt. Women's clubs in rural areas can help through educational programs on good woodlot and range management, protection of plant cover from fire, and good farming practices.

As the land manager can contribute to a good watershed environment and the production of usable water, so can any citizen contribute to his community's welfare by being interested in the water conditions in his area. He should know about the quality of the water, the reasons for its purity or impurity, the possible effect of pollution on the health and welfare of the community, and the ways to cope with any dangers. Only through the action of informed local citizens can a start be made toward a solution of this problem.

Questions for Discussion

1. Does clear water necessarily mean pure water?

2. If you live on a farm, is your well safe from pollution?

3. What precautions are taken with drainage from the barn, other animal shelters, and outhouses?

4. What are your State laws on water pollution?

5. Is sediment damage to reservoirs, city water systems, and house plumbing a problem in your area? How is this related to land and resource management?

6. How many different uses are made of water from the river or stream supplying your wants? Do any of these uses contribute to pollution?

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6. Motion picture: "Clean Waters," produced by General Electric Company, approved by U.S. Public Health Service. (Available through General Electric sales offices.)

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